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EXAMINER	
TAT, BINH C	

ART UNIT	PAPER NUMBER
2825	

DATE MAILED: 08/15/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/774,857	FUNG ET AL.	
	Examiner	Art Unit	
	Binh C. Tat	2825	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *22 May 2006*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-61* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-61* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *09 February 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *05/22/06*.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application (PTO-152)

6) ☐ Other: _____.

DETAILED ACTION

1. This Final office action is in response to the amendments and remarks 10/774857 file on 12/09/05.

Claim 1-61 remain pending in the application.

Claim Rejections - 35 USC § 101

Claim 59 rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter. The act of the claimed expresses an abstract idea of selecting routing resources to increase delay for connection without specifies any data, functional, or practical application is non-statutory, see MPEP 2106 [R-3].

Claims 60-61 are also rejected under 35 U.S.C. 101, because they are depending on claim 59.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claim 59 is rejected under 35 U.S.C 112, first paragraph as being a "single step/means" claim, note MPEP 2164.08 (a). Claim 60-61 are rejected because they depend on claim 59.

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claim 59 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. This claim recites the limitation "selecting routing resources to ...." is unclear and

Claim 59-60 are Rejected because "increase delay" and "minimum delay" are contradicting claimed limitations without clear justification, Thus, unclear and indefinite PD

incomplete as to routing resources of/from what/where, and "hold time requirements" is unclear and incomplete as to hold time of /from/what/where. Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

Claims 60-61 are also rejected under 35 U.S.C. 112, second paragraph because they are depending on claim 59.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claims 1-61 are rejected under 35 U.S.C. 102(e) as being anticipated by Brahme et al. (US Patent 6973632).

3. As to claims 1, and 33, Brahme et al. teach a method for designing a system, comprising: determining minimum and maximum delay budgets for connections along a path by finding a set of connection delays that attempt to satisfy the short-path (see fig 9 element 931, and fig 10 element 1033) and long-path (see fig 9 element 933, and fig 10 element 1031) timing constraints for the path (see fig 3 Fig. 4, fig 5, fig 6-8, element 405-417, col 6 line 10 to col 8 line 11, and Especially, and fig 9-10 col 9 lines 19-53, and col 6 line 40 to col 7 line 3); and selecting routing resources for the connections in response to the minimum and maximum delay budgets (see fig 4-10 element 417 col. 2 line 14 to col 3 line 16, and col 6 line 60 to col. 7 lines 51).

4. As to claims 2, and 34, Brahme et al. teach wherein determining minimum and maximum delay budgets comprises considering lower and upper delay limits of routed connections based on potential routing possibilities (see fig 9, fig 10, fig 15a-15b, and fig 16 col 9 line 19-48 and 10 line 63 to col 11 line 19).

5. As to claims 3, and 35, Brahme et al. teach wherein lower delay limits of the routed connections are determined based on an initial selection of routing resources that minimizes connection delays and ignores shorted signals (see fig 9, fig 10, fig 15a-15b, and fig 16 col 9 line 19-48 and 10 line 63 to col 11 line 19).

6. As to claims 4, and 36, Brahme et al. teach wherein determining minimum and maximum delay budgets comprises starting with initial estimates of final routed delay (see fig 4 element 405-417, col 7 line 13-51, and col 12 line 12-38).

7. As to claims 5, and 37, Brahme et al. teach wherein estimates of final routed delay are determined based on an initial selection of routing resources for connections that minimizes connection delay (see fig 4 element 405-417, col 7 line 13-51, and col 12 line 12-38 and background).

8. As to claims 6, and 38, Brahme et al. teach wherein estimates of final routed delay are determined based on an initial selection of routing resources for connections that ignores shorted signals (see fig 4 element 405-417, col 7 line 13-51, and col 12 line 12-38 and summary).

9. As to claims 7, and 39, Brahme et al. teach wherein the short-path and long-path timing constraints are provided by a user (see fig 9, fig 10, fig 15a-15b, and fig 16 col 9 line 19-48 and 10 line 63 to col 11 line 19).

10. As to claims 8, and 40, Brahme et al. teach wherein determining minimum and maximum delay budgets for the connections comprises allocating short-path and long-path slack (see fig 3-10 and fig 15-16 col 7 line 13 to col 9 line 48, Especially col 8 line 12-62).

11. As to claims 9, and 41, Brahme et al. teach wherein allocating the delay in order to satisfy the long-path and short-path timing constraints comprises: performing short-path timing analysis to determined short-path slack values (see fig 3-10 and fig 15-16 col 7 line 13 to col 9 line 48, Especially col 9 line 18-53); fixing any short-path violations determined by the short-path timing analysis budgets (see fig 3-10 and fig 15-16 col 7 line 13 to col 9 line 48, Especially col 10 line 63 to col 11 line 19); performing long-path timing analysis to determine long-path slack values (see fig 3-10 and fig 15-16 col 7 line 13 to col 9 line 48, Especially col 9 line 18-53); and fixing any long-path violations determined by the long-path timing analysis budgets (see fig 3-10 and fig 15-16 col 7 line 13 to col 9 line 48, Especially col 10 line 63 to col 11 line 19).

12. As to claims 10, Brahme et al. teach wherein fixing any short-path violations comprises adding delay in response to the short-path slack values and connection weightings (see fig 3-10 and fig 15-16 col 7 line 13 to col 9 line 48, Especially col 9 line 18-53).

13. As to claims 11, Brahme et al. teach wherein the connection weightings are determined by a unit weighting scheme (see fig 3-10 and fig 15-16 col 7 line 13 to col 9 line 48, Especially col 9 line 18-53).

14. As to claims 12, Brahme et al. teach wherein the connection weighting is determined based on how much delay can be added before a practical limit is reached or all relevant violations are resolved (see fig 3-10 and fig 15-16 col 7 line 13 to col 9 line 48, Especially col 10 line 63 to col 11 line 19).

15. As to claims 13, Brahme et al. teach wherein fixing any long-path violations comprises subtracting delay in response to the long-path slack values and connection weightings (see fig 3-10 and fig 15-16 col 7 line 13 to col 9 line 48, Especially col 10 line 63 to col 11 line 19).

16. As to claims 14, and 42 Brahme et al. teach wherein allocating the long-path and short-path slack comprises: performing long-path timing analysis to determine long-path slack values (see fig 3-10 and fig 15-16 col 7 line 13 to col 9 line 48, Especially col 9 line 18-53); allocating long-path slack determined by the long-path timing analysis (see fig 3-10 and fig 15-16 col 7 line 13 to col 9 line 48, Especially col 10 line 63 to col 11 line 19); performing short-path timing analysis to determine short-path slack values (see fig 3-10 and fig 15-16 col 7 line 13 to col 9 line 48, Especially col 9 line 18-53); and allocating short-path slack determined by the short-path timing analysis (see fig 3-10 and fig 15-16 col 7 line 13 to col 9 line 48, Especially col 10 line 63 to col 11 line 19).

17. As to claims 15, Brahme et al. teach wherein allocating long-path slack comprises adding delay to temporary delays in response to the long-path slack values and connection weightings (see fig 3-10 and fig 15-16 col 7 line 13 to col 9 line 48, Especially col 9 line 18-53).

18. As to claims 16, Brahme et al. teach wherein the connection weightings are determined by a unit weighting (see fig 3-10 and fig 15-16 col 7 line 13 to col 9 line 48, Especially col 9 line 18-53).

19. As to claims 17, Brahme et al. teach wherein the connection weighting is determined based on how much delay can be added before a practical limit is reached or all relevant slack is allocated (see fig 3-10 and fig 15-16 col 7 line 13 to col 9 line 48, Especially col 9 line 18-53).

20. As to claims 18, Brahme et al. teach wherein allocating short-path slack comprises subtracting delay from temporary delays in response to the short-path slack values and connection weightings (see fig 3-10 and fig 15-16 col 7 line 13 to col 9 line 48, Especially col 10 line 63 to col 11 line 19).

21. As to claims 19, and 43, Brahme et al. teach wherein selecting routing resources for connections in response to the minimum and maximum delay budgets comprises re-selecting the routing resources for connections whose current proposed routes do not meet the minimum and maximum delay budgets (see fig3-8 col 6 line 28 to col 7 line 50).

22. As to claims 20, and 44, Brahme et al. teach wherein selecting routing resources for connections in response to the minimum and maximum delay budgets comprises re-selecting the routing resources for connections that are shorted (see fig3-8 col 6 line 28 to col 7 line 50 and summary).

23. As to claims 21, and 45, Brahme et al. teach wherein selecting routing resources for connections in response to the minimum and maximum delay budgets comprises decreasing minimum delay budgets based on the number of routing iterations that have occurred (see fig 2 fig 3-8 col 2 line 14-49 and col 7 line 13 to col 8 line 61).

24. As to claims 22, and 46 Brahme et al. teach wherein selecting routing resources for connections in response to the minimum and maximum delay budgets comprises increasing maximum delay budgets based on the number of routing iterations that have occurred (see fig 2 fig 3-8 col 2 line 14-49 and col 7 line 13 to col 8 line 61).

25. As to claims 23, and 47, Brahme et al. teach wherein selecting routing resources for connections in response to the minimum and maximum delay budgets comprises utilizing a cost function (see fig 3-8 col 6 line 41 to col 8 line 12).

26. As to claims 24, Brahme et al. teach wherein the cost function scores routing resources as candidates for selection in completing a connection route (see fig 3-8 col 6 line 41 to col 8 line 12).

27. As to claims 25, Brahme et al. teach wherein the lowest cost routing resource is efficiently tracked via use of a heap (see fig 3-8 col 6 line 41 to col 8 line 12 and background).

28. As to claims 26, Brahme et al. teach wherein the cost function for a routing resource is based, in part, on the delay of the respective routing resource (see fig 3-8 col 6 line 41 to col 8 line 12 and background).

29. As to claims 27, Brahme et al. teach wherein the cost function for a routing resource is based, in part, on a prediction of the delay to reach the destination from the respective routing resource (see fig 3-8 col 6 line 41 to col 8 line 12 and background and summary).

30. As to claims 28, Brahme et al. teach wherein the cost function for a routing resource is based. in part, on how the total estimated routing delay of the connection if the routing resource is used compares with the minimum and maximum delay budget of the connection (see fig 3-8 col 6 line 41 to col 8 line 12 and background and summary).

31. As to claims 29, Brahme et al. teach wherein the cost function for a routing resource is based, in part, on the number of competing signals that want to use the respective routing resource (see fig 2 fig 3-8 col 2 line 14-49 and col 7 line 13 to col 8 line 61).

32. As to claims 30, Brahme et al. teach further comprising increasing the penalty associated with several competing signals wanting to use the same resource in the cost function as connection re- routing attempts occur (see fig 2 fig 3-8 col 2 line 14-49 and col 7 line 13 to col 8 line 61).

33. As to claims 31, Brahme et al. teach further comprising increasing the penalty associated with several competing signals wanting to use the same resource in the cost function, based, in part, on how many signals wanted to use the resource in previous routing attempts (see fig 2 fig 3-8 col 2 line 14-49 and col 7 line 13 to col 8 line 61 and summary).

34. As to claims 32, Brahme et al. teach further comprising increasing the penalty associated with several competing signals wanting to use the same resource in the cost function, based, in part, on how many routing iterations have occurred (see fig 2 fig 3-8 col 2 line 14-49 and col 7 line 13 to col 8 line 61).

35. As to claims 48, Brahme et al. teach a system designer, comprising: a slack allocator unit that generates minimum and maximum delay budgets for connections along path from long-path (see fig 9 element 933, and fig 10 element 1031) and short-path (see fig 9 element 931, and fig 10 element 1033) timing constraints for the path provided by user (see fig 3 Fig. 4, fig 5, fig 6-8, element 405-417, col 6 line 10 to col 8 line 11, and Especially, and fig 9-10 col 9 lines 19-53, and col 6 line 40 to col 7 line 3); and a routing unit that selects routing resources in a system to route the connections in response to the minimum and maximum delay budgets (see fig 4-10 element 417 col. 2 line 14 to col 3 line 16, and col 6 line 60 to col. 7 lines 51).

36. As to claims 49, Brahme et al. teach wherein the slack allocator comprises a timing analysis unit that generates long-path and short-path slack values for the connections in response to connection delays and the long-path and short-path timing.

37. As to claims 50, Brahme et al. teach wherein the slack allocator comprises a delay adjustment unit that modifies a set of temporary connection delays in order to attempt to satisfy the long-path and short-path timing constraints (see fig 3-10 col 7 line 13 to col 9 line 52).

38. As to claims 51, Brahme et al. teach wherein the slack allocator comprises a delay adjustment unit that modifies a set of temporary connection delays to allocate long-path and short-path slack (see fig 3-8 col 6 line 41 to col 8 line 12 and background).

39. As to claims 52, Brahme et al. teach wherein decreasing minimum delay budgets based on the number of routing iterations that have occurred comprises decreasing the minimum delay budgets of connections that are competing for routing resources other connections want (see fig 2 fig 3-8 col 2 line 14-49 and col 7 line 13 to col 8 line 61).

40. As to claims 53, Brahme et al. teach wherein increasing maximum delay budgets based on the number of routing iterations that have occurred comprises increasing the maximum delay budgets of connections that are competing for routing resources other connections want (see fig 3-8 col 6 line 41 to col 8 line 12 and background).

41. As to claims 54, Brahme et al. teach wherein the cost function for a routing resource is based, in part, on the delay incurred reaching the respective routing resource from the connection source (see fig 2 fig 3-8 col 2 line 14-49 and col 7 line 13 to col 8 line 61).

42. As to claims 55, Brahme et al. teach wherein the prediction of the delay to reach the destination from the respective routing resource is based, in part, on the minimum and maximum delay budget (see fig 3-8 col 6 line 41 to col 8 line 12 and background and summary).

43. As to claims 56, Brahme et al. teach wherein the short-path timing constraints comprises a hold time requirement (see fig 3 Fig. 4, fig 5, fig 6-8, element 405-417, col 6 line 10 to col 8 line 11, and Especially, and fig 9-10 col 9 lines 19-53, and col 6 line 40 to col 7 line 3).

44. As to claims 57, Brahme et al. teach wherein the short-path timing constraints comprises a minimum propagation delay (see fig 3-10 and fig 15-16 col 7 line 13 to col 9 line 48, Especially col 9 line 18-53).

45. As to claims 58, Brahme et al. teach wherein the short-path timing constraints comprises a minimum clock-to-output requirement (see fig 3-10 and fig 15-16 col 7 line 13 to col 9 line 48, Especially col 9 line 18-53).

46. As to claims 59, Brahme et al. teach a method for designing a system, comprising: selecting routing resources to increase delay for connections in response to path-level hold time (see fig 9, fig 10 element 901, 1001) requirements (see fig 3 Fig. 4, fig 5, fig 6-8, element 405-417, col 6 line 10 to col 8 line 11, and Especially, and fig 9-10 col 9 lines 19-53, and col 6 line 40 to col 7 line 3).

47. As to claims 60, Brahme et al. teach wherein selecting routing resources comprises; determining a minimum delay budget for tàe connections from path-level timing constraints (see fig 4-10 element 417 col. 2 line 14 to col 3 line 16, and col 6 line 60 to col. 7 lines 51); and selecting routing resources for the connections in response to the minimum delay budget (see fig 4-10 element 417 col. 2 line 14 to col 3 line 16, and col 6 line 60 to col. 7 lines 51).

48. As to claims 61, Brahme et al. teach wherein the routing resources are programmable logic device routing resources (see col 1 line 34 –67 and col 6 line 10-40).

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 59-61 are rejected under 35 U.S.C. 102(b) as being anticipated by chen et al. (US Patent 5649167).

49. As to claims 59, Chen et al. teach a method for designing a system, comprising: selecting routing resources to increase delay for connections in response to path-level hold time requirements (see fig 12-14 col 1 line 49 to col 2 line 8, and 10 line 54 to col12 line 42).

50. As to claims 60, Chen et al. teach wherein selecting routing resources comprises; determining a minimum delay budget for tàe connections from path-level timing constraints (see fig 9-11 col 9 line 20 to col 10 line 53); and selecting routing resources for the connections in response to the minimum delay budget (see fig 9-11 col 9 line 20 to col 10 line 53).

51. As to claims 61, Chen et al. teach wherein the routing resources are programmable logic device routing resources (see col 5 line 38- col 6 line 57).

Applicant's arguments with respect to claims 1-61 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Binh C. Tat whose telephone number is 571 272-1908. The examiner can normally be reached on 7:30 - 4:00 (M-F).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jack Chiang can be reached on 571 272-7483. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Binh Tat
Art unit 2825
August 3, 2006

PAUL DINH
PRIMARY EXAMINER

Paul Dinh